

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK**

CARNEGIE INSTITUTION OF WASHINGTON,

M7D CORPORATION,

Plaintiffs,

v.

PURE GROWN DIAMONDS, INC.,

IIA TECHNOLOGIES PTE. LTD D/B/A

IIA TECHNOLOGIES,

Defendants.

Civil Action No. 1:20-cv-00189-JSR

CARNEGIE INSTITUTION OF WASHINGTON,

M7D CORPORATION,

Plaintiffs,

v.

FENIX DIAMONDS LLC,

Defendant.

Civil Action No. 1:20-cv-00200-JSR

PLAINTIFFS' REBUTTAL CLAIM CONSTRUCTION BRIEF

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TABLE OF ABBREVIATIONS

'078 Patent	U.S. Patent No. 6,858,078
RE'189 Patent	U.S. Patent No. RE41,189
Defendants	Defendants Fenix Diamonds LLC, Pure Grown Diamonds, Inc., and IIA Technologies Pte. Ltd d/b/a IIA Technologies
Fenix	Defendant Fenix Diamonds LLC
Fenix Br.	Defendant Fenix Diamonds LLC's Opening Claim Construction Brief, No. 20-cv-200, ECF Nos. 30, 32
Fenix Ex.	Exhibits attached to the Declaration of Maxwell B. Snow, No. 20-cv-200, ECF Nos. 31-1-12
PGD	Defendants Pure Grown Diamonds, Inc. and IIA Technologies Pte. Ltd d/b/a IIA Technologies
PGD Br.	Initial Claim Construction Brief of Defendants Pure Grown Diamonds, Inc. and IIA Technologies Pte. Ltd., No. 20-cv-189, ECF No. 32
PGD Ex.	Exhibits attached to the Declaration of J. Preston Long, No. 20-cv-189, ECF Nos. 33-1-8
Plaintiffs	Plaintiffs Carnegie Institution of Washington and M7D Corporation
Pls. Br.	Plaintiffs' Opening Claim Construction Brief, No. 20-cv-189, ECF No. 31; No. 20-cv-200, ECF No. 29

I. INTRODUCTION

Plaintiffs' constructions are consistent with the plain, ordinary, and customary meaning of the claim terms to a skilled artisan and the specifications of the asserted patents. By contrast, Defendants' constructions would fundamentally and improperly alter the meaning of the claims.

II. CLAIM CONSTRUCTIONS FOR THE '078 PATENT

A. "controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C" (claims 1 and 12)

<u>Plaintiffs' Construction</u>	<u>PGD's Construction</u>	<u>Fenix's Construction</u>
no construction needed (plain and ordinary meaning)	plain and ordinary meaning, that is, "using temperatures measured at the middle and an edge of a growth surface of the diamond to maintain all temperature gradients across the growth surface at less than 20° C"	plain and ordinary meaning, that is, "using temperatures measured at the middle and an edge of a growth surface of the diamond to maintain all temperature gradients across the growth surface at less than 20° C"

Defendants' construction improperly rewrites the '078 claims. Instead of the requiring what the claims demand, "controlling" growth surface temperature, Defendants would demand (i) "using" (ii) two specific (iii) "measured" temperature points to (iv) "maintain" the claimed temperature gradients. That is not what the claims recite, and none of Defendants' arguments for rewriting the claims are availing.

To support the first half of their proposed construction "using temperatures measured at the middle and an edge of a growth surface of the diamond," PGD misquotes the '078 specification in two ways. First, citing a single sentence in the specification, PGD contends that the inventors conceded as "well-known in the art" the exercise of feedback control over MPCVD parameters like process temperature, gas mass flow, plasma parameters, and reactant flow rates. PGD Br. 5

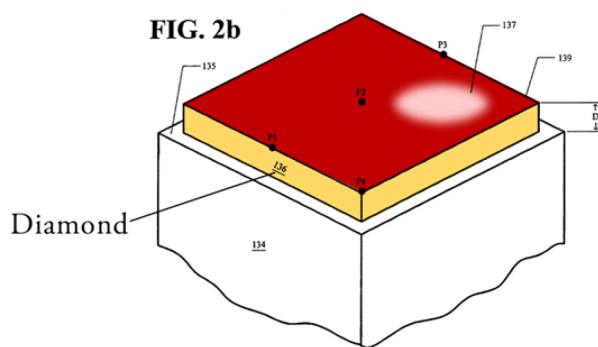
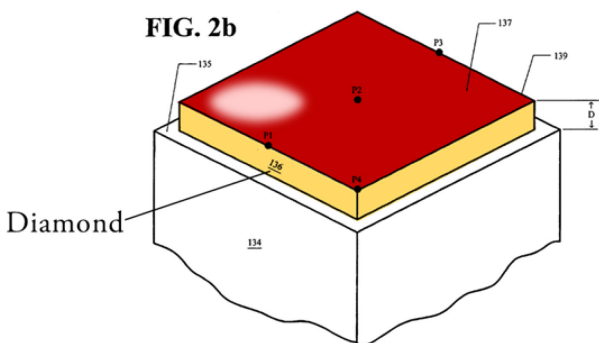
(citing '078 Patent at 6:20-25). Then, based on that same sentence, PGD asserts the inventors admitted that “[c]ontrolling the temperature in a single spot” was also “well-known.” *Id.* But the cited statement merely acknowledges that electronic feedback control was well-known, not that controlling growth surface temperatures during MPCVD was well-known.

Proceeding from that mistaken premise, PGD argues that the claimed invention must differ from “run-of-the-mill temperature control” by “using, at a minimum, temperatures measured at the middle and at an edge of a growth surface to ensure the temperature gradients remain below 20° C.” *Id.* at 5-6. But the claims do not recite “using” or “measuring” anything. PGD’s argument also reflects a striking misunderstanding of the specification, which recites at least *ten* parameters for controlling growth surface temperature to ensure that all temperature gradients across the growth surface are less than 20°C: heat sinking capability of the stage, positioning of the top surface of the diamond in the plasma, uniformity of the plasma that the growth surface of the diamond is subjected to, quality of the thermal transfer from edges of the diamond via a holder or sheath to the stage, microwave power, coolant flow rate, coolant temperature, gas flow rates, reactant flow rate, detection capabilities of an infrared pyrometer, and holder repositioning. *See* Pls. Br. at 9 (citing '078 Patent at 6:55-65, 11:12-31). And none of these parameters requires that a particular measurement be “used” or a condition “maintained.”

For its part, Fenix argues that because a temperature gradient is a “variation” or “difference,” the claims require measuring temperature difference from “at least two locations.” According to Fenix (at 4), “It is not possible to control a single temperature gradient, let alone ‘all temperature gradients,’ without measuring temperatures at different points.” Fenix’s logic is temptingly simple but easily disproven. Consider, for example, the art of cooking on an open fire. Because direct exposure to flame may result in high temperature variations across a cooking

surface, many campers control internal temperature gradients by using cast iron cookware whose structural design guarantees even heat throughout its interior without the need to pack a thermometer. Similarly, the '078 Patent teaches that process parameters and mechanisms such as the ten parameters listed above can be used to control the growth surface temperature inside the chamber as claimed without “measuring temperatures at different points,” and without “using” those measurements every (or any) time the claimed method is performed.

Fenix goes even further astray by arguing (at 6) that, “as a matter of physics,” measuring temperatures at the middle and an edge of a diamond growth surface “is the only way to determine the maximum temperature gradient.”¹ Not so. Growth surface heat patterns may have localized hot spots (e.g., from “isolated ‘outcroppings’ or twins” as described at column 13:4-18) for which the maximum temperature difference will not be reflected by middle and edge temperature measurements but would be reflected by one or more measurements localized on the hot spot itself. Examples of such heat patterns are illustrated below.



¹ Fenix’s brief confusingly refers to point P1 of Figure 2b as the “middle point” even though point P2 sits in the geometric center of the growth surface. Fenix also refers to point P4 as the “edge/corner point,” even though Points P1 and P3 also sit on the “edge” of the diamond as illustrated. Fenix’s construction would introduce ambiguity regarding which “middle” and “edge” measurements must be used.

Far from a “critical” feature, PGD Br. 6, a temperature measurement “at the middle and an edge of the growth surface” is just an *exemplary* input to the controller in an *exemplary* embodiment of the invention. The patent does describe embodiments in which growth surface temperature control may be controlled by “*at least* tak[ing] into account a temperature measurement between the middle and an edge 139 of the growth surface 137.” ’078 Pat. at 7:9-21 (emphasis added). But that language itself recognizes that other inputs may also be considered. Even more important, this passage describes only an “alternative” indication of the gradients across the growth surface. *Id.* at 7:24-46; *see id.* at 12:16-20. The inventors did *not* describe a middle and edge measurement in every embodiment, and not a single claim recites such a measurement.

To support the second half of their proposed construction, “using temperatures measured ... to maintain all temperature gradients across the growth surface at less than 20° C,” the Defendants turn to extrinsic evidence. But extrinsic evidence plays second fiddle to intrinsic evidence, and Defendants’ extrinsic evidence is especially unpersuasive.

PGD and Fenix both quote passages from the complaints in which Plaintiffs allege that their infringing CVD diamonds are made “by a process requiring maintaining the growth surface temperature gradient to within 20°C, as recited in independent claims 1 and 12 of the ’078 Patent.” PGD Br. 7-8, Fenix Br. 8-9 (emphasis omitted). But the wording of Plaintiffs’ complaints does not support Defendants’ construction. As recited in independent claims 1 and 12 of the ’078 Patent, growth surface temperature gradients must indeed be kept to within 20° C. And as alleged in Plaintiffs’ complaints, Defendants’ processes require maintaining those gradients. But nothing in Plaintiffs’ complaints (or, for that matter, in the ’078 specification) suggests that independent claims 1 and 12 require “using temperatures measured” to maintain those gradients. Nor, to be

clear, do Plaintiffs allege that Defendants do so. Rather, Plaintiffs believe, based on currently available information, that Defendants ensure proper gradients by controlling other process parameters like those set forth in the '078 specification. Defendants' authorities stating that a plaintiff may not contradict the allegations in its complaint are irrelevant because Plaintiffs have not done so.

As additional extrinsic evidence, PGD offers three cherry-picked dictionary definitions for "control" that reflect elements of measurement. PGD Br. 8-9; PGD Exs. F, G, H. But PGD provides no reason for the Court to "focus[] [its] inquiry on the abstract meaning of words" in dictionaries "rather than on the meaning of claim terms within the context of the patent." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1321 (Fed. Cir. 2005) ("Properly viewed, the 'ordinary meaning' of a claim term is its meaning to the ordinary artisan after reading the entire patent.") Even if this Court were to consider dictionary definitions of "control" when construing this term, PGD's definitions are inapposite. The definitions provided at Ex. F and Ex. G define the noun "control," not the verb "control" used in the claims. The definition provided at Ex. H is at least for a verb, but PGD focuses on definition "3" because it includes their desired element of "comparison" but ignores broader definition "1" which is more consistent with the inventors' use of the term throughout the specification: "To exercise authority or influence over." Even in the days before *Phillips* when dictionary definitions played a larger role, the Federal Circuit recognized that "[w]here there are several common meanings for a claim term, the patent disclosure serves to point away from the improper meanings and toward the proper meanings." *Brookhill-Wilk I, LLC v. Intuitive Surgical, Inc.*, 334 F.3d 1294, 1300 (Fed. Cir. 2003) (citation omitted).

Here, the jury will understand without any formal construction that the temperature of a growth surface can be "controlled" in this broader sense (i.e., "influenced") by any of the

mechanisms set forth in the specification. Contrary to Defendants’ arguments, this is the ordinary meaning of “control.”

Lazare Kaplan International, Inc. v. Photoscribe Technologies, Inc., 628 F.3d 1359, 1366 (Fed. Cir. 2010), further undermines Defendants’ constructions. *Lazare* involved a patent for microinscribing a gemstone with “laser energy.” *Id.* Although the claim expressly recited steps of “imaging the gemstone from at least one vantage point” and “controlling the directing of the focused laser energy based on the marking instructions and the imaging,” the district court erred by limiting the controlling term to “*automatic* feedback derived from optical images of the gemstone *during the laser burn process.*” *Id.* at 1366-67, 1370 (emphasis added). The Federal Circuit concluded that “one of ordinary skill in the art at the time of the invention would have understood [the controlling term] to include control based on either automated or manual feedback derived from optical images of a gemstone, before or during the laser burn process.” *Id.* at 1369.

The “controlling” limitation here is even broader than in *Lazare* because the claims do not recite controlling temperature “based on” anything. Defendants identify no claim language limiting the ’078 Patent’s “controlling” term to the use of feedback from temperature measurements during growth. As in *Lazare*, the term “control” encompasses a variety of actions. These can include actions based on feedback collected during the growth process, but can also include actions based on information collected from past growth processes, and actions based on information external to the growth process.

Courts regularly decline to narrow limitations involving “control” for similar reasons. For example, in *ASM America, Inc. v. Genus, Inc.*, No. C-01-2190-EDL, 2002 WL 1892200 (N.D. Cal. Aug. 15, 2002), *amended by* 2003 WL 21033555 (N.D. Cal. Jan 10, 2003), *aff’d*, 401 F.3d 1340 (Fed. Cir. 2005), the district court concluded that no express construction was necessary for two

limitations of a claim to a method for processing semiconductor wafers: “controlling the temperature of the substrate” and “controlling the partial pressure of [a vapor] to delay condensation” *Id.* at *33. As here, the defendant sought to narrow the control limitations to require taking active measurements as inputs to the control process. *Id.* at *34 (proposing construction for temperature term of “***directly measuring and maintaining the temperature of the substrate*** by an apparatus for heating semiconductor substrates” (emphasis added)); *38 (proposing construction for pressure term of “to control the pressure of particular gas in a mixture of gases ***through the use of a feedback loop***” (emphasis added)). But the court agreed that no construction was necessary, noting that (as here) the defendants had relied on passages in the specification that were “not a definition of the term ‘controlling,’ but simply provide[d] examples of several ways to control the temperature of the substrate.” *Id.* at *34; *see id.* at *39 (“[T]he summary of the invention and the plain language of the claim support [plaintiff’s] contention that the ’568 patent does not require any particular method of controlling the partial pressure.”).

Finally, PGD half-heartedly argues (at 9-10) that this term is a “step-plus-function” term subject to construction under 35 U.S.C. § 112 ¶ 6. PGD did not present this argument in its joint claim construction chart and did not raise it in any discussion with Plaintiffs before filing its brief, so its belated appearance in PGD’s brief is improper. Even if the argument were timely, it fails.

Unlike apparatus claims, which are frequently drafted in “means plus function” format invoking Section 112 ¶ 6, “step plus function” claim elements are very rare. Section 112 ¶ 6 applies ***only*** if a method claim element (i) recites a step that is individually associated with a specified function, *and* (ii) does ***not*** recite the act necessary to perform the step and achieve the function. *Epcon Gas Sys., Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1028 (Fed. Cir. 2002); *see also O.I. Corp. v. Tekmar Co.*, 115 F.3d 1576, 1583 (Fed. Cir. 1997) (noting that “[i]f we were

to construe every process claim containing steps described by an ‘ing’ verb, such as passing, heating, reacting, transferring, etc. into a step-plus-function limitation, we would be limiting process claims in a manner never intended by Congress”). If a claim element does not use the literal terminology “step for,” Section 112 ¶ 6 will not apply to that element “without a showing that the limitation contains *nothing* that can be construed as an act.” *See Masco Corp. v. United States*, 303 F.3d 1316, 1327 (Fed. Cir. 2002) (emphasis added).

Here, the term at issue does not contain the term “step,” and it does not associate any generic step with a function without describing an act. Rather, the term expressly requires an act (“controlling temperature of a growth surface of the diamond”) and states the consequence of that act (“such that all temperature gradients across the growth surface are less than 20° C.”). The term was not drafted in “step plus function” format, nor was it examined that way during prosecution.

PGD’s authority, *Agere Systems Inc. v. Atmel Corp.*, No. 02–864, 2003 WL 21652264 (E.D. Pa. May 27, 2003), does not support its position. In that case, a claim was construed in step-plus-function format only after *both parties’ experts* conceded that it lacked sufficient disclosure of supporting acts. *Id.* at *22. But PGD has offered no evidence, expert or otherwise, that the claim does not require an act—and it plainly does: “controlling temperature of a growth surface of the diamond.”

In any event, even if this term were subject to construction under section 112 ¶ 6, Defendants’ construction would still be improper, as the claim would be construed to encompass *all* the acts set forth for “controlling temperature of a growth surface of the diamond,” including not only the two measurements identified by Defendants but also *all* the mechanisms for temperature control set forth in the ’078 Patent at, for example, column 6:55-65 and column 11:12-

31. *See O.I. Corp.*, 115 F.3d at 1583 (claim construed under section 112 ¶ 6 covered all steps specified in the written description and equivalents thereof).

As set forth in Plaintiffs’ opening brief, the words and phrases that make up this limitation are not confusing or unclear. The limitation is simple and understandable to a jury. It requires controlling temperatures of the diamond growth surface so that the differences between temperatures at points across the surface are less than 20° C. Defendants would fundamentally recast this limitation to require “using measured temperatures” from set points at the “middle and an edge” of the “growth surface” and to add an ambiguous “maintain[ing]” component. Those are transparent and improper efforts to import limitations from the specification in hopes of escaping infringement. The Court should reject their invitation and stick with the clear claim language.

B. “the growth surface” (all asserted claims)

<u>Plaintiffs’ Construction</u>	<u>PGD’s Construction</u>	<u>Fenix’s Construction</u>
plain and ordinary meaning, that is, “the diamond seed surface or diamond surface that is closest to the plasma, upon which single-crystal growth primarily occurs as the diamond grows”	plain and ordinary meaning, no construction necessary	plain and ordinary meaning, that is, “the surface upon which diamond growth is occurring”

PGD offers no good justification for leaving this claim term unconstrued. Indeed, it gets tripped up in its own argument. PGD says that growth occurs on the growth surface (which is true), so the growth surface should be defined as wherever growth occurs. Avoiding such circular reasoning is the very purpose behind Plaintiffs’ construction of this term.

Contrary to PGD’s assertions, the intrinsic record plainly supports Plaintiffs’ construction. The ’078 specification uses the term “growth surface” interchangeably with the term “top surface”

and explains that this surface is “positioned within a region of the plasma 141 ... above the deposition chamber floor 122” and “is initially the diamond seed portion 138 and is then the grown diamond portion 140 as the diamond grows.” ’078 Pat. at 4:56-67; *see also id.* at 11:1-7 (discussing an embodiment in which temperature measurements are taken “of the growth surface” and describing “the growth surface” as “the top surface of the growing diamond portion 140”); 12:6-12 (discussing an embodiment in which temperature measurements are taken “of the growth surface of the diamond, either the diamond seed or a newly grown diamond portion on the diamond seed,” and describing “the growth surface” as “the top surface of the growing diamond portion 140”); 12:12-16 (discussing an embodiment in which temperature measurements are taken “of the growth surface, which is the top surface of the seed diamond portion”). PGD’s brief ignores *every* reference in the specification to “top” surface. And it fails to cite even a single specification passage in which the term “growth surface” refers to anything other than the top surface of the diamond seed or grown diamond—because there is none.

Plaintiffs have offered their construction to confirm that the term “growth surface” has a *geometric* meaning and to present that meaning in a manner the jury can understand. In technical terms, the growth surface is portion of the nominal crystallographic plane upon which homoepitaxial growth occurs in a direction normal to the plane. In almost every instance (and in every example in the specification), “growth surface” will refer to the “top surface” (the surface away from the stage and near the plasma) on which substantially single-crystal growth occurs during MPCVD. But the inventors could not have anticipated every chamber configuration in the world, and using the term “top” in claim construction might improperly limit the claims to “upright” configurations in which the plasma cloud is directly “above” the stage relative to the direction of gravitational force. Because the inventive methods could be applied to a chamber

configuration in which the plasma is placed to the “side” of a stage or diamond, Plaintiffs seek a construction—based on the actual words of the patent specification—that accurately identifies the surface (whether of the diamond or diamond seed) on which substantially single-crystal growth occurs.

PGD and Fenix criticize Plaintiffs’ construction for referring to this surface as “closest to the plasma” when the growth surface is frequently “inside” the plasma. But even under those circumstances, neither defendant contends that any surface of the diamond is closer to the plasma than the surface in the plasma. Even if multiple surfaces are immersed in the plasma, only one surface, the growth surface, will be entirely (or near-entirely) immersed within the plasma. Likewise, to the extent lateral faces of the growing diamond might also be partially “inside” the plasma, they are not “closest” compared to the primary growth surface, and they are not surfaces on which substantially single-crystal growth occurs.

Fenix tries to insert a “temporal aspect” to this term. The Court should decline Fenix’s invitation, as neither the ’078 Patent nor Plaintiffs’ construction is unclear in this regard. There is nothing temporal about the term “growth surface.” The “growth surface” is still the “growth surface” even when the plasma is turned off for repositioning of the diamond, and the specification makes clear that such repositioning can be undertaken to reposition the growth surface into a desired region of space to which the plasma will thereafter be applied. *See* ’078 Pat. at 8:5-14 (“In the diamond production system 100, the growth process is periodically halted so that the position of the diamond 136 can be adjusted This repositioning allows the diamond growth ... on the growth surface of the diamond 136 to occur within a desired region of resonant power within the plasma 141.”); *see also id.* at 10:11-15 (“[R]epositioning ... allows the diamond growth on the growth surface of the diamond 136 to occur within a desired region of resonant power within the

plasma 341.”), 2:57-65, Fig. 6, Fig. 7. Properly read, the specification and claims repeatedly use the term “growth surface” as a *geometric* signifier, not as a *temporal* signifier. *See, e.g., id.* at 13:48-51 (describing an infrared pyrometer as focused “at an incident angle of 65 degrees on the growth surface”); 17:44-48 (defining an axis of translation within a diamond growth chamber as “substantially perpendicular to the growth surface”); 17:58-18:2 (same); 18:5-9 (same); 18:34-39 (same).

Fenix criticizes Plaintiffs’ construction for failing to cover “some CVD processes” that “produce only polycrystalline diamond” or that involve diamond growth on a non-diamond substrate. But claim terms are not construed “in a vacuum, devoid of the context of the claim as a whole.” *Kyocera Wireless Corp. v. Int’l Trade Comm’n*, 545 F.3d 1340, 1347 (Fed. Cir. 2008). The parties agree that the asserted claims are directed to the manufacture of largely single crystal diamond. Fenix does not explain why the scope of this claim term should be read to cover the manufacture of *purely* polycrystalline diamonds when the asserted claims expressly state that they are directed to “single crystal diamonds.” It is entirely proper—indeed, required—to construe the term “growth surface” consistent with the rest of the claim language.

Finally, Fenix argues that the phrase “surface ... upon which single-crystal growth *primarily* occurs” is ambiguous. But Plaintiffs’ construction captures the inventors’ recognition that some polycrystalline growth can occur. Consistent with the discussion of “single crystal diamond” (below), the parties all recognize that no process is perfect, and some polycrystalline growth occurs during the growth process covered by this patent. *See infra* Section IV. The specification expressly recognizes that in some embodiments single crystal growth can occur with a “small degree of polycrystallinity” at the top edges of the diamond. ’078 Pat. at 13:67-14:1. Plaintiffs’ construction simply recognizes that fact.

A person of ordinary skill in the art would understand from the specification and claims that the claimed “growth surface” is “the diamond seed surface or diamond surface that is closest to the plasma, upon which single-crystal growth primarily occurs as the diamond grows.”

C. “growing single-crystal diamond ... on the growth surface at a growth temperature in a deposition chamber having an atmosphere with a pressure of at least 130 torr” (claim 1) and “growing single-crystal diamond ... on the growth surface at a temperature of 900–1400° C” (claim 12)

<u>Plaintiffs’ Construction</u>	<u>PGD’s Construction</u>	<u>Fenix’s Construction</u>
plain and ordinary meaning, no construction needed	plain and ordinary meaning, that is, “growing single-crystal diamond ... on the growth surface, which is maintained at a growth temperature and located in a deposition chamber with an atmosphere maintained at a pressure of at least 130 torr”	plain and ordinary meaning, that is, “growing single-crystal diamond ... on the growth surface, which is maintained at a growth temperature and located in a deposition chamber with an atmosphere maintained at a pressure of at least 130 torr”

<u>Plaintiffs’ Construction</u>	<u>PGD’s Construction</u>	<u>Fenix’s Construction</u>
plain and ordinary meaning, no construction needed	plain and ordinary meaning, that is, “growing single-crystal diamond ... on the growth surface, which is maintained at a temperature of 900–1400° C”	plain and ordinary meaning, that is, “growing single-crystal diamond ... on the growth surface, which is maintained at a temperature of 900–1400° C”

Defendants candidly admit that their proposed construction—which calls for “maintaining” the claimed pressures and temperatures and ties those temperatures to the claimed “growth surface”—is a “narrowing construction.” PGD Br. 14; *see also* Fenix Br. 18 (acknowledging that its construction adds “limitations” to the claims). But Defendants provide no valid reason or authority to support narrowing this claim term in this way.

To justify its construction, PGD strains to create ambiguity where there is none. The claim terminology (“growth temperature” and “growing ... at a temperature”) have a plain meaning: the process temperature at which the single crystal diamond is growing. PGD also questions “whether the conditions recited in these terms must be maintained concurrently with the temperature gradients on the growth surface.” PGD Br. 15. But the ambiguity is of PGD’s own making, as the claim never mentions “maintaining” anything. PGD also fails to explain why a need for understanding of the term “growth temperature” justifies the addition of a limitation to the claim that does not exist, particularly when Defendants did not identify “growth temperature” as a term for construction.

PGD is incorrect in asserting that the ’078 Patent is “unequivocal” that the claimed temperatures “refer to the temperature of the growth surface and not, for example, the temperature of the atmosphere within the deposition chamber or some other temperature.” *Id.* To be sure, in some embodiments the surface temperature of the diamond being grown is the growth temperature, or the surface temperature may provide an indication of the growth temperature—but not “unequivocally” so. PGD quotes selected exemplary embodiments involving measuring or controlling growth surface temperature. *Id.* at 16. But *none* of PGD’s quoted passages refer to the specific temperature range set forth in claim 12 (and in the family of claim 1), “900–1400° C.” This is a crucial omission, as those exact growth temperatures are described in the specification as a “*process temperature*”, i.e., the temperature at which the diamond is growing.

In general, the methods in accordance with exemplary embodiments of the present invention are designed to create large, high-quality diamonds with increased [100] growth rates. ***The process temperature may be selected from a range of about 900–1400° C.,*** depending on the particular type of single-crystal diamond that is desired or if oxygen is used.

'078 Pat. at 13:19-24; *see also id.* at 13:38-56 (describing an exemplary process performed at a “process temperature” of “1220° C”); 14:8-26 (describing the type of diamond produced at various “process temperatures” from “<1000° C” to “>1300° C”). By contrast, the '078 patent nowhere specifies a required temperature *or* temperature range for the growth surface—only required temperature *gradients*. Tellingly, PGD fails to cite *any* of the passages above in addressing this term. Fenix, for its part, appears to have recognized that there is no intrinsic support linking the claim term “growth temperature” to the growth surface temperature, as its brief does not defend that aspect of its construction and acknowledges that the claimed “growth temperature” refers to the “process temperature.” *See* Fenix Br. 17-18.

As to the “maintaining” portion of Defendants’ construction, Fenix argues that giving this term its plain and ordinary meaning (as Plaintiffs request) would “read out of the claim” a “limitation” that the recited parameters “be maintained during diamond growth.” Fenix Br. 18. But a limitation cannot be “read out” of a claim in which the limitation does not appear—particularly a limitation which the Defendants have conjured from thin air for the claim construction exercise. *See Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1367 (Fed. Cir. 2012) (“The patentee is free to choose a broad term and expect to obtain the full scope of its plain and ordinary meaning unless the patentee explicitly redefines the term or disavows its full scope.”).

The specification and claim language directly contradict Defendants’ reasons for adding “maintaining” into the claims. PGD contends that “statements in the specification further make clear that the claimed pressure and temperatures conditions are maintained during diamond growth.” PGD Br. 17. But nothing in the claims or specification suggests that the claimed process requires that the specified temperatures and pressures be “maintained” for any fixed period of time.

Nor do they mandate, as Fenix contends (at 18), that the temperatures and pressures cannot “stray beyond the claimed ranges during growth.” The claims are drafted in open-ended format as a method “comprising” the claimed steps. The term “comprising” is a patent-law term of art that “recognize[s] that inventions may be practiced with steps in addition to those listed in the claims.” *Smith & Nephew, Inc. v. Ethicon, Inc.*, 276 F.3d 1304, 1311 (Fed. Cir. 2001). Nothing in the claims or specification precludes performing additional steps, such as growing steps performed outside of the claimed ranges, or additional annealing or cutting steps for removing undesired material from the diamond once grown. In fact, the specification expressly discloses additional steps for processing of the diamond, ’078 Pat. at 14:40-49, and the academic paper by the inventors incorporated by reference makes clear that those steps involve raising a diamond to temperatures outside the claimed ranges for several hours “*during MPCVD growth.*” Fenix Ex. I at 12525 (emphasis added).

Invitrogen Corp. v. Biocrest Manufacturing, L.P., 327 F.3d 1364 (Fed. Cir. 2003), is on point. There, the Federal Circuit held that a district court erred by construing a claimed process having the transitional phrase “comprising” and reciting the step “growing E. coli cells in a growth-conducive medium at a temperature of 18° C. to 32° C.” as excluding processes that started growing cells outside the claimed temperature range but then completed a growing step inside the recited temperature range. *Id.* at 1366, 1368 (emphasis omitted). The Federal Circuit explained:

The transition “comprising” in a method claim indicates that the claim is open-ended and allows for additional steps. Claim 1 uses the open-ended transition “comprising” to introduce the recited steps. Thus the claim signals to patent practitioners that claim 1 allows activity, even activity that produces E. coli cell growth, before the recited steps. Such activity outside the claim, of course, is not limited by the temperature range recited in claim 1. Thus, the district court erred by extending the claim’s temperature restrictions beyond the reach of the claims. The claim language and its form do not restrict activities to prepare the cells that occur before the claimed method.

Id. at 1368 (citations omitted); *see also id.* at 1369.

Finally, Fenix contends (at 19) that the '078 Patent “disavowed claim scope” by characterizing some diamond growth at temperatures below 1000° C or above 1300° C as undesirable. But Fenix provides no authority for the novel proposition that an ***expressly recited numerical range*** within a claim (in fact, a range found in the original patent claims filed with the specification) must be narrowed simply because the specification identifies some products produced within that range as less desirable than others. This is miles from the “expressions of manifest exclusion or restriction” that must be present in the specification to represent “a clear disavowal of claim scope” from the ordinary and accustomed meaning of a claim term. *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). In any event, Fenix’s own construction does not reflect such a disavowal, as it maintains the complete claimed temperature range of 900-1400° C in its proposed definition.

Defendants improperly seek to rewrite this claim term to require that the diamond must be kept at a single temperature or pressure (or range of temperatures or pressures) during its entire growth. They would also introduce confusion about what actions are needed to “maintain” such temperatures and pressures. The claims do not require maintenance of a single temperature or pressure, or even a closed-ended range of temperatures and pressures. Jurors would have no trouble understanding the claims’ ordinary English terms requiring that diamond growth occur “at” a growth temperature and in a chamber “with” a stated pressure (claim 1), or “at” a temperature falling within a stated range (claim 12). No construction of this term is needed.

III. CLAIM CONSTRUCTIONS FOR THE RE'189 PATENT

A. “to improve the optical clarity of [a] CVD diamond” (all asserted claims)

<u>Plaintiffs’ Construction</u>	<u>PGD’s Construction</u>	<u>Fenix’s Construction</u>
plain and ordinary meaning, that is, “to decrease the opacity of CVD diamond”	This phrase is non-limiting in the alternative, plain and ordinary meaning, that is, “to make CVD diamond appear more clear”	This phrase is non-limiting. If limiting, then the phrase is indefinite.

As set forth in Plaintiffs’ opening brief, this term is a claim limitation for multiple reasons. It introduces (provides “antecedent basis” for) the term “CVD diamond,” which is referred to later in the claims as “the CVD diamond.” *Eaton Corp. v. Rockwell Int’l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003); *Pacing Techs., LLC v. Garmin Int’l, Inc.*, 778 F.3d 1021, 1023–24 (Fed. Cir. 2015). And it provides meaning to the claimed steps of raising the diamond to a claimed temperature and pressure. *See Pitney Bowes Inc., v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999) (preamble limiting when it sets out requirement that is fundamental to the claim—in patent-law parlance, “‘necessary to give life, meaning, and vitality’ to the claim” (quoting *Kropa v. Robie*, 187 F.2d 150, 152 (CCPA 1951))).

PGD omits the word “the” from the term for construction and then, from that mistaken premise, argues that this term “does not provide an antecedent basis or other information necessary to understand the body of the claim.” PGD Br. 22. But the claim language makes clear that “**the** CVD diamond” raised in the claim to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase is the **same** CVD diamond whose optical clarity is improved “by” such steps. *See Pacing Techs.*, 778 F.3d at 1023-24 (finding reference in

preamble to a “repetitive motion pacing system for pacing *a user*” provided antecedent basis for later reference to “*the user*” in the claim (emphasis added)).

PGD further argues that “[d]eletion” of the phrase for construction “[would] not affect the structural definition or operation of the [invention] itself.” PGD Br. 22 (quoting *Arctic Cat Inc. v. GEP Power Prods.*, 919 F.3d 1320, 1329 (Fed. Cir. 2019)). But this is demonstrably untrue. As shown below, if the term were deleted, the claim would nonsensically refer to “A method where the CVD diamond is single crystal CVD diamond, by raising ...”:

Claim 1 with term included	Claim 1 with term deleted
1. A method to improve the optical clarity of CVD diamond where the CVD diamond is single crystal CVD diamond, by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase.	1. A method where the CVD diamond is single crystal CVD diamond, by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase.

This claim term is not, as Fenix argues, a “laudatory statement” or “statement of intended purpose,” Fenix Br. 20, but rather a meaningful part of the claim which explains the outcome of the steps that follow it. Indeed, the phrase “optical clarity” was added to the claim by amendment during prosecution, in part to distinguish the claimed invention from a prior art process directed not to improving diamond optical clarity, but to the mechanical process of “fixing ... diamond in ... sintered carbide buttons, inserts and bodies.” PGD Ex. A at 12, 14. Where the prosecution history suggests that the preamble language was amended to distinguish a prior art reference, such amended language will serve as a claim limitation. *See Invitrogen*, 327 F.3d at 1370.

As for the meaning of “optical clarity,” PGD identifies no intrinsic support for its construction “make CVD diamond appear more clear.” PGD cites the very same passages referring to “opacity” cited in opening Plaintiffs’ brief. PGD Br. 23-24. As explained in Plaintiffs’

opening brief, those passages support Plaintiffs’ construction, not PGD’s. Fenix, for its part, again manufactures ambiguity by suggesting that “darker diamond is preferable for some applications.” Fenix Br. 21. Even assuming that is the case, the claim language expressly calls for “improved optical clarity.” In the context of a measurable characteristic like “clarity,” the term “improved” unambiguously refers to *more* clarity, i.e., decreased opacity. *See Invitrogen*, 327 F.3d at 1370-71 (district court correctly construed “improved competence” to mean “the number or quantity of *E. coli* cells...is generally increased [compared to baseline]”). The Defendants appear to agree on this point: PGD recognizes that the improved diamond becomes “more clear,” and Fenix asks the Court to adopt PGD’s construction. Fenix Br. 21.

Plaintiffs’ proposed construction avoids jury confusion and is drawn directly from the specification, and so should be adopted by the Court.

B. “by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase” (all asserted claims)

The parties have now agreed to a construction of this term: “by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 gigapascals (GPA), where the temperature and the pressure are together outside of the diamond stable phase.” Plaintiffs provide no further comment.

IV. CLAIM CONSTRUCTION COMMON TO BOTH PATENTS

A. “single-crystal diamond” (’078 claims 1 and 12) and “single crystal CVD diamond” (RE’189 claim 1)

<u>Plaintiffs’ Construction</u>	<u>PGD’s Construction</u>	<u>Fenix’s Construction</u>
plain and ordinary meaning, that is, “a stand alone diamond [made by chemical vapor deposition] having a substantially single-crystal structure”	plain and ordinary meaning, that is, “a stand alone diamond [made by chemical vapor deposition] having insubstantial non-monocrystalline growth”	plain and ordinary meaning, that is, “a stand alone diamond [made by chemical vapor deposition] having insubstantial polycrystallinity”

In some respects, the parties’ dispute regarding this claim term is semantic. Each party agrees that (a) the claim language refers to a stand-alone stone, and (b) although the stone is mostly single-crystal, as in nature there can be some polycrystallinity. But Defendants’ narrowing constructions ignore the intrinsic record, misread data and information incorporated into the ’078 Patent specification, and unnecessarily complicate the claim language for the jury.

To begin with, each Defendant proposes defining the claim language not by what it *is*, but rather by what it is *not*, and then uses language that appears nowhere in the patent or its prosecution history. That is improper. *See Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1322-23 (Fed. Cir. 2003) (claims should not be construed to contain a negative limitation without support in the specifications or file history). Neither Defendant recites any authority to support turning an otherwise positively recited limitation into a negatively recited limitation.

To make matters worse, each Defendant argues that the specification language that refers to a “small degree of polycrystallinity” should be recharacterized as meaning “insubstantially” polycrystalline, and each Defendant suggests this is considerably narrower than Plaintiffs’ proposed meaning of “substantially single crystal.” To the extent Defendants’ descriptions of their

definitions are correct, they are inconsistent with the intrinsic record. In ordinary parlance, “small” means “having comparatively little size or slight dimensions.” *See* Ex. B, MERRIAM WEBSTER’S COLLEGIATE DICTIONARY (10th ed. 1995), “small.” In contrast, “insubstantial” is understood to mean “not substantial: as [] lacking substance or material nature.” *Id.*, “insubstantial.” This definition of “insubstantial” is circular and does not provide any clarity to the fact finder. On the other hand, the ordinary meaning of “substantial” is “considerable in quantity” or “being largely but not wholly that which is specified.” *Id.*, “substantial.” Rather than using circular language, “substantial” is a term of degree with a meaning that can be readily understood by lay jurors and is consistent with the specification’s description of the amount of polycrystallinity in a single crystal diamond made or annealed under the claimed methods.

Defendants rely on the language of dependent claims 36 and 57 and the doctrine of claim differentiation. But they ignore that the independent claims from which claims 36 and 57 depend use language that differs from asserted claims 1 and 12. Independent claims 32 and 44 refer only to a “diamond” and do not recite a “single crystal diamond”; it is that “diamond” that is further narrowed by dependent claims 36 and 57. Claims 36 and 57 thus use the term “substantially” to specify the proportion of the overall diamond being produced that is single crystal, whereas Plaintiffs’ proposed construction characterizes what the term “single crystal diamond” itself means. Patentees are entitled to use different language in different claim sets to define the metes and bounds of their invention, as done here. *See Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380–81 (Fed. Cir. 2006) (“Different claims with different words can, of course, define different subject matter within the ambit of the invention. On the other hand, claim drafters can also use different terms to define the exact same subject matter.”).

Finally, Fenix relies on the content of the incorporated Yan reference to support its assertion that the claimed CVD diamond “cannot exhibit *any* polycrystallinity.” Fenix Br. 14. To begin with, Fenix’s own proposed definition acknowledges that some polycrystallinity can be present in a “single crystal diamond.” Moreover, Fenix’s argument is circular, in that there is nothing in the Yan article that suggests the authors of the article did not understand “single crystal diamond” to include a “small amount” of polycrystallinity. Nothing in the article suggests that the authors’ reference to a “single crystal diamond” meant that they believed they had improved on Nature and produced a purely perfect single crystal diamond.

Moreover, Fenix misreads Yan as suggesting that only a “small amount of black diamond-like carbon” kept the produced diamond from being a platonic “single crystal diamond.” Fenix Br. 14-15. Figure 3 of Yan shows the X-ray diffraction peak from an unmasked region of the grown diamond as being significantly wider than that of its seed, suggesting a substantial amount of non-single crystal structures at the edges of the diamond. Fenix Ex. I at 12525. A person skilled in the art of X-ray diffraction would know that the peak shape of Fig. 3a could be caused by many factors including low-angle grain boundary formation, twinning, and strains imposed by non-diamond forms of carbon, all of which could be present in the structure that the inventors nevertheless referred to as “single crystal diamond.”

The Court should adopt Plaintiffs’ positive definition of this term, which is consistent with the intrinsic evidence and would helpfully clarify the term for the jury.

V. CONCLUSION

Plaintiffs respectfully request the Court adopt Plaintiffs’ proposed constructions.

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